AMRAD NEWSLETTER

Amateur Radio Research and Development Corporation Jan/Feb 84

AMRAD Meetings for 1984

As listed in the last issue of the newsletter the following is the list of monthly AMRAD meetings (Note that Sept. is not the first Monday, as that is a holiday):

February 6	Hal Feinstein on Spread Spectrum
March 5	
April 2	
May 7	Update on Trenton and Dayton
June 4	Horse Race Preparations
July 2	
August 6	
September 10	
October 1	
November 5	
December 3	Annual Business Meeting

Upcoming Events

June 4th Meeting

The June 4th AMRAD meeting will feature Bill Pala, WB4NFB, briefing the group on the up-coming 100 mile Old Dominion Ride horse race, June 9th and 10th. Bill will bring maps and the official race Communications Plan. Copies of the plan will be provided to volunteers. Dave Borden, K8MMO, will detail the packet radio participation and Elton Sanders, WB5MMB, will discuss the voice repeater and packet repeater preparations. This activity represents AMRAD's yearly public service radio event and volunteers are welcome to come to the meeting and sign up for some activity. Using packet radio in this public service event probably represents some sort of first for AMRAD. In any case it will be a lot of fun.

Manassas Hamfest

The Ole Virginia Hams A.R.C., Inc. will be holding a hamfest Sunday, June 3, 1984 at the Prince William County Fairgrounds 1/2 mile south of Manassas on Route 234. Talk in 146.37/146.97 repeater, 146.52 simplex. Admission $4.

FOR SALE

A full set of BYTE Magazine from issue #1 to Sept. '83. Includes six binders. All for $75, if you pick up in Crystal City. K6HPR 685-7155

8273 Chips $20
Charlie Obermeyer
P.O. Box 6871
Alexandria, VA 22306

DISKLESS WORDSTAR

MicroPro International has announced a series of wordprocessing and calcsheet software for Epson's PX-notebook computer, which is not available yet in the United States.

MicroPro claims that its 64-kbyte ROM package is the first "diskless" software to maintain file and user compatibility with the parent (Wordstar) disk version. Called Portable Wordstar, Calc and Scheduler, it can access microcassette (and diskette) data files.

Portable Wordstar supports continuous wordwrap, justification and editing operations and is tailored for use in an 80-column x 8-line LCD display.

Portable Calc allows flexible cell formation up to 64 columns by 256 rows, and uses 16-digit be displayed in either integer, decimal or scientific notation formats, with up to 12 significant digits plus exponent. All of the status, prompt and column-border graphics have been simplified into just two lines of the LCD's eight, leaving a scrolling window of six lines high for the user.

The Scheduler program allows users to create appointment schedules months in advance, with the PX-8 computer alerting the user at a preset warning interval, even if the system is turned off.

The three programs are contained in just two, 32-kbyte, matchbook-sized ROM capsules. These operate under the PX-8's CP/M 2.2 operating system. That CP/M compatibility ensures that PX-8 users can transmit or receive files from desktop Wordstar systems for use on the Epson portable.

X.25 Chip Gets Go-ahead

Western Digital's (Irvine, CA) WD 2511 X.25 packet-switching communication controller has received certification from GTE Telenet to operate as an interface device on the link level of GTE Telenet's data network. Designers can thereby add communication capabilities to their systems at minimal cost in PC board real estate, chip count, and power consumption. Along with Ethernet controller chips from other vendors, such as Intel and Seeq Technology, the new device is following the industry trend toward putting sophisticated functions onchip to simplify the system implementation process.

Printed copies of the Third ARRL Amateur Radio Computer Networking Conference were received on April 13. Copies are now available for sale at $10. The booklet has 124 pages of packet-radio papers and a reprint of CCIR 476-3 -- the basic specification for AMTOR.

Interference Problem

On April 16, ARRL Technical Department Manager Paul Rinaldo, W4RI attended a meeting of the American National Standards Institute C63 ad hoc committee meeting on RFI immunity in Washington, D.C. The meeting centered on developing protection distances between various radio services (such as amateur, CB, and AM broadcast) and TV receivers. The group is trying to come up with meaningful theoretical figures on how far away a TV set has to be from a ham's QTH to be free from interference, a very difficult set of numbers to come up with. These figures will assist the committee to establish standards for making TV receivers less susceptible to radio frequency interference, on of the objectives of Public Law 97-259.

1,200-baud modem for Bell 202 or V.23 use

Housed in a 22-pin dual in-line package, the MC145450 1,200-baud modem can be pin-programmed for either Bell 202 or V.23 application. The silicon-gate complementary-MOS frequency-shift-keying modem is TTL-compatible.

In the Bell 202 mode, the main channel can receive data at baud rates of up to 1,800 b/s, while the back channel can transmit at baud rates of up to 150 b/s. For V.23 applications, the chip is mode-2 compatible for baud rates of up to 1,200 b/s on the main channel and up to 75 b/s on the back one.

A logic-controlled innput selects the frequency pair used for modulation and demodulation, as well as the transmit and receive transmission rates. The clear-to-send signal goes low in response to high-to-low transitions on the request-to-send line and can be delayed in eight steps under logic control.

PROTOCOL

David W. Borden, K8MMO
Rte 2, Box 233B
Sterling, VA 22170
703-450-5284

Trenton

Terry, WB4JFI, Bill, WB4NFB, Howard, WD5DBC and I went to Trenton N.J. for the annual Trenton Computerfest and Networking conference. It was an interesting time with lots of different ideas floating around. The progress noted:

Hardware: XEROX 820 $50 surplus boards abound and getting Jon Bloom's bit sync working with the SIO on the 820 is high priority.

Software: Harold Price, NK6K, is writing AX.25 Level 3 network code. He will take note of the specification that Terry proposed at Trenton. It will probably be done in C, the language of the moment. Phil Karn has coded AX.25 Level 2 in C and gave us a copy to see how he has done. It is missing the main loop.

Protocol: Terry, WB4JFI presented a lot of AX.25 Level Three ideas which seem to go over well in that the TAPR coders took note. Under the law of "THE CODE RULES", I think it is all over but the bureaucratic meetings and paperwork. By the time of the next meeting, I expect Harold Price will have a large slug of code to read from.

Proceedings: You can read all about Trenton doings in the proceedings. It is available from the American Radio Relay League, 225 Main Street, Newington, CT 06111. Send $10 to cover costs of printing and mailing.

New England

The New England packet radio gang is working with the XEROX 820 board. After receiving Phil Karn's C code at Trenton, they coded the missing main loop and a transmitter turn on routine. Great work gang! Now I have to get my 820 board up and running sonner than planned.

Horse Packets

It appears that as I type we have three packet stations lined up for the Old Dominion Hundred Mile Horse Race on June 12/13. Bob Bruniga, the software hacker on this project, will not be able to attend, but Sandy, WB5MMB will run his station at the 50 mile finish (mid-course for the 100 mile race). Terry, WB4JFI will be at net control which is Bill, WB4NFBs cabin. I will be at the 4H center, the start and finish of the race. We will have a porta-digipeater, Commodore 64 and TRS-80 Model 100 computers, VADCG and GLB packet boards. It should be good fun. Bob's software continues to work well and will receive further testing in the next several weeks. See past AMRAD newsletters for discussion of the distributed data base in use in this application.

Porta Packet

The TRS-80 Model 100 lap computer is very popular with packeteers. Terry, WB4JFI brought his to lunch the other day and ran packets from his briefcase using a GLB board and battery from a Sony vidio recorder. I bought one at Trenton and am planning similar exploits. We need some software to run on it to stroke the GLB in TNC fashion so we do not have to type so much to send a packet. If anyone writes any, let us have a copy. I will probably use a Bill Ashby board. I have to find a modem, probably an International Reservations attached to the top of an attache case along with the TNC and ICOM IC2. Now I need a heads up packet display for my car.

Mobile Packet

The problem is that the heads up display must display mirror image on the windshield (probably stuck in the air conditioning vent right under the window). Any ideas on my display needs, mail them in. It probably should be LED for brightnss. Sandy, WB5MMB, needs one also for deaf packet work with his wife Nan, WD4DAJ. A display should be cheaper than VOTRAX voice output. The place on my windshield I want it normally displays the hood only, so I am not loosing any driving vision.

Plans

During the coming months, I will be trying to get the STD bus computer to go 56 kilobits and trying to get my XEROX board running packet. Terry will be working on the Pocket Packet Peeper Pager Project (PQUAD) and helping me put C code on whatever it will fit on. Send in any packet radio applications you can think of. The before mentioned Trenton proceedings has several good applications, we need more.

Xerox 820 Big Board

The rage of the packet world is the discovery of the Xerox 820 sellout. Earlier this year, Xerox made available a single board computer (similar to the DRC of Texas "Big Board") for $50. Do not send letters, phone calls or anything concerning the purchase of these boards. By the end of April, they were all gone. AMMRAD members all bought some, just because we can not resist a good bargain. Now to get them working. I am typing this column on one, having struggled for a while on it. The main problem that I had was a bad memory chip. Briefly describing the board you received from Xerox, it has a Z80, 64K of memory, floppy disk controller, SIO (one user port and one printer port) and video/keyboard circuits. I connected up a monitor, keyboard, floppy disk and power supply and got it working. I received from R. Dunbar some video mods which I applied. I provide them here so that you may get one of these things up quickly. First, get the documentation which Xerox did not supply. Send $15 to Ferguson Engineering, P.O.Box 300085, Arlington, Texas 76010 and ask for the complete Xerox 820 documentation package. It is great. They have lots of other stuff you might like, such as the CRT connector that plugs into the board, CBIOS source, etc. You could go wild spending money there, expanding to 256K RAM, etc.

Xerox Video Modifications

First, obtain a 10 pin video connector, either by buying it from Ferguson Engineering or making it by taking a standard floppy disk cable connector (the one that goes on the controller end) and cutting it with a hacksaw/file to 10 pins. These connectors are made by AMP and others and are .1 inch pin to pin and .1 inch row to row. I used the hacksaw technique because I had extra floppy connectors. Next, find a monitor. I started with the Zenith ZVM131 which I used on my Commodore 64. It had RGB input and separate horizontal and vertical sync inputs which is what Xerox provides. Correct the overscanning by changing R10 from 180K to 22K and R11 from 47K to 82K. If you have a monitor like my Zenith, connect the horizontal sync from the Xerox to positive horizontal sync input on the monitor. Connect the vertical sync to the negative vertical sync on the monitor (yes, Virginia, it is negative). Connect the video output from the Xerox to either Red, Blue or Green input on your monitor. The Xerox wants +12, -12 and +5 volts (at 3-5 amps). Applying the power is another hassle. The Molex

CONTINUED ON NEXT PAGE.....

connector is a 9 pin type, available somewhere. I borrowed a matching power supply from WB4NFB. Xerox ran out of these even before they ran out of the big board. If you want to use a monitor like I have used, you can now connect the floppy and go to work. If not, make composite video as follows:

1. Remove R58, 150 ohms, near pin 7 of J1.
2. Remove R60, 150 ohms, between U106 and U117 near U105.
3. Cut trace from U117-10 near the pin on the bottom of the board.
4. Solder a 39 ohm resistor (use spaghetti) between U117-10 and the right hole from which R60 was removed (it goes to J7-5).
5. Using one lead of a 100 ohm resistor, jumper J7-3,4,5 together and connect the other end of the resistor to J7-10 (ground).
6. Reverse the horizontal sync polarity by cutting trace too U15-4 (on top of board) between that pin and the adjacent feedthru. Route a jumper on the bottom of the board from the feedthru to U15-13.

You will now have composite video on J7-3,4,5 and ground on J7-8,9,10. Dunbar advises that if you have DC coupled input on your monitor, you may wish to couple the video thru a 100 uf capacitor shift in the black level. He recommends a Zenith ZVM-122A amber/green monitor. I am buying one soon as I have to give back the borrowed CONRAC I am using to write this.

Next, I am going to connect Jon Bloom's (KE3Z) state machines to that SIO and packet. More on that soon.

XEROX 820 Software

I guess you are going to ask about software. Get the CBIOS from Ferguson Engineering. Take your current CP/M (you should buy another copy to use on this board) and install the new CBIOS on it. That gets you up and running using DDT and SYSGEN to get the thing onto tracks 0 and 1 of an eight inch disk. Now a bad thing happens. It boots off of the second drive (A to CP/M and DR2 to the Shugart 801 jumper). Some mods are going to be needed here to make a normal system operation, but I am not convinced they are worth the trouble.It works OK and Howard, WD5DBC, reports all is normal once you put a disk into DR1. I am just now adding my second drive, I will report on any new developments. This thing is a great buy. Ferguson may have more at $175, call them and see.

Correspondence from Bob Bruniga, WB4APR

From: WB4APR
To: Vancouver Packet Board Experts

Subj: Software Development

1. The following is an unsolicited summary of my needs as a Vancouver packet board user. These items are listed in descending order of priority from my perspective. Other users will undoubtedly have different perspectives, but this, at least gives you some input into your queue.

2. Things that can be done within the existing ROM and RAM space now that the CW ID has been removed:

* Raise CTS on terminal side when the board connected. This allows a user to recognize in hardware when the board is connected. Several uses:
    1. Autostart printer
    2. Reset of host device
    3. opening of gateway...RTTY gateways, HF gateways
* Do not have the board initiaize into MONITOR mode, but have that as an option, such as CTRL-P M.
* Have the board initialize into a HOST mode with the following features:
    1. Initiate packet transmission on special characters of LF, :, ?,
    2. No monitor mode until selected.
    3. No-echo on, unless deselected.
* Fix the Repeater SSID byte so that it shows up in monitor mode properly shifted.

3. Other things which do require significant software space:

* Multiple repeater address capability
* Built in repeater capability as a selectable option

4. I know of the large amount of effort involved in assembly language programming and would help if I had the tools. Remember I am a 6800 type with no 8080 tools. I do not want the VADCG to be obsoleted by adding on all kinds of bells and whistles which are unnecessary to the basic link function just to keep up with the TAPR board. I do agree that more RAM and ROM is needed as we move on towards level III, but until that time, and for those who believe that level III should be implemented in a host device, a minimum level for the VADCG board should continue to be supported.

5. Just a lone cry from the wilderness..... Keep up the good work.

Sincerely,

Bob Bruniga
WB4APR

Newsletter Changes--As you may have noticed this newsletter is a combined January/February issue. It will be followed closely with a March/April, and then a May/June issue. By July we will be back on a monthly schedule. We thank you for your patience while we are revamping our newsletter organization.

Beginning with the May/June issue, there will be a new author for the PROTOCOL column. Terry Fox, WB4JFI will take over from Dave Borden, K8MMO.We are not losing Dave entirely. He will be writing a new column for us entitled DIGITAL DEVELOPMENT. This should really give the newsletter a boost.

AX.25 Protocol Information Available on CBBS

The AMRAD CBBS is currently being reslanted by the SYSOP, WB4JFI, to concentrate on packet radio applications and development. To this end, Terry has placed useful files on the third disk drive (drive "C"). They include the AX.25 Level 2 specification, the assembly language code for the AX.25 Level 2 protocol running on the Vancouver and Ashby boards (both the TIP and the LIP) and several other files. To obtain access to these files, write Terry Fox, WB4JFI at the AMRAD address, P.O. Drawer 6148, McLean, VA USA 22106-6148 and Terry will supply a read password to allow downloading of these files. You should have the Ward Christensen MODEM7 program to download the information to your computer. You could also just type them using the command provided and take them in with some other program of your choice.

ARMSTRONG: THE GENIUS OF FM IS RECOGNIZED

Edwin Howard Armstrong, '13 B.S. '29 Eng.Sc.D. (1890-1954), is one of four American inventors who will be honored in a series of commemorative stamps to be issued September 21. Modern radio, frequency modulation transmission of sound, television, long-range radar, satellite communications, and space probes--all are rooted in Armstrong's discoveries. A professor of electrical engineering here at Columbia for many years, Major Armstrong, as he preferred to be known, was the inventor of the FM radio, as well as the regenerative circuit, the superheterodyne circuit, superregeneration, and multiplex transmission.

Born in New York in 1890, Armstrong entered Columbia in 1909. While an undergraduate in the electrical engineering department, he created the regenerative detector circuit, by means of which the feeble radio impulses received through the air could be fed back (hence the alternate name "feedback circuit"), built up, and increased thousands of times in strength. Experimenting with the audion tube devised by Lee De Forest, he found that if he took the radio signal as it came from the audion and fed part of it back to reinforce the signal coming into the tube, this reinforced signal would in turn be amplified by the audion. If the process were repeated numerous times, it could increase the signal strength several thousand times. This invention took radio beyond the crystal-detector headset stage, vastly expanding the range of radio reception; as a consequence of this invention, the audition of messages by loudspeaker became possible. Still an undergraduate, and lacking the $150 needed to patent his discovery, Armstrong had the paper with his drawing of the circuit notarized on January 31, 1913.

Shortly thereafter, Armstrong made another important discovery about regeneration: when the amount of signal fed back into the audion reached a certain level, the tube began to oscillate on its own--to generate periodic, high-frequency radio waves. His first use of the circuit had increased the strength of the signal at the receiver. This newer principle of continuous-wave oscillation led to the vacuum-tube transmitter. As a source of high frequency electric currents, it became one of the most universally used circuits in the entire field of electrical communications and electronics.

Armstrong graduated in 1913 with a degree in electrical engineering. He took a job as an assistant at the engineering school in order to continue using its laboratories, and in his free time set up a radio station in Professor Michael I. Pupin's laboratory. He remained at Columbia throughout his career, succeeding Pupin in his chair on the faculty, a position he held until his death.

Having discovered two different uses of the feedback circuit at different times, Armstrong filed separate patent applications. His first patent was issued on October 6, 1914, and royalties began pouring in to the young inventor. But then Lee De Forest, who had filed for a patent on the "ultra-audion" in 1914, attacked Armstrong's papers, claiming that they revealed nothing new about the audion. De Forest filed another patent application, which in effect claimed Armstrong's discoveries of the signal-amplifying and oscillating functions of the audion as his own. Interference proceedings ensued, but while the case was in progress the U.S. entered World War I and De Forest and Armstrong declared a truce.

In 1917, Armstrong went into the Army as a captain in the Signal Corps, and was sent to the front to investigate the French Army's signaling methods. There he tackled a serious problem: the inability of receivers to detect weak high-frequency signals. With German transmitters merely four or five miles away, many of their signals were being missed by French radio operators. In puzzling through this problem, as well as that of detecting unseen enemy planes, Armstrong made his next great invention: the superheterodyne, which was to become the standard radio receiver circuit and the basis of modern radar; it remains the basis of all electronic Allies an edge in field communications for the rest of the war.

After the armistice, while still in Europe, Armstrong received word that De Forest was pressing action on the lawsuit. He returned to the U.S. in the summer of 1919, and was at once embroiled in litigation; greatly in debt to his lawyers, Armstrong accepted an offer from Westinghouse to buy his patents on the regenerative circuit and the superheterodyne. In the summer of 1922 the U.S. Circuit Court of Appeals decided in his behalf. He returned to Columbia and his work with Pupin in static elimination.

That same year, while setting up a routine experiment, he stumbled uppon a discovery destined to bring him his greatest financial rewards, though it was the least important to him scientifically: the superregenerative circuit. He discovered that the audion tube could be made to pass current at an even greater rate, beyond the level where it would ordinarily begin to oscillate, if it were trigered on and off every 20,000th of a second. The receiver would produce what appeared to be a steady signal of tremendous amplitude. When the discovery was made public, the radio world anticipated that it would revolutionize the industry by drastically reducing the number of vacuum tubes in a receiver, thereby reducing the size of the receiver and cutting costs. RCA bought him out for $200,000 and 60,000 shares of its common stock, making him the largest individual stockholder in the company. It later developed that the superregenerative circuit was of little value to RCA: it lacked selectivity, and commercial radio had advanced to the point where the ability to tune in many closely spaced stations was essential. Ultimately, the circuit went into use in two-way communication, such as ship-to-shore and police services, where powerful amplification was necessary.

Armstrong was a flamboyant personality, given to dramatic gestures. While courting his wife, Marion McInnis, he travelled to Europe and brought back a Hispano-Suiza, an expensive and flashy car, to impress her. A few months later, at the formal opening of Station WJZ, he climbed to the top of the new transmitter--400 feet above 42nd Street--where he proceeded to do one-armed handstands while waving to the anxious crowds below.

As a wedding gift, in 1924, he presented his new bride with the first portable radio--a cumbersome contraption the size of a suitcase, surmounted by a bell-shaped loudspeaker. (After Armstrong's death, she gave it to the Smithsonian Institution, where it remains on exhibit.)

But the jubilant inventor in his first flush of success ultimately gave way to a care-worn middle-aged man, whose energies and fortunes were devoured by an unending series of patent litigations, wherein he attempted to gain legal recognition of his brilliant inventions. The patent disputes continued to grow in intensity. In the spring of 1924, De Forest won an interference in a District of Columbia Court, resulting in the issuance of his patents on the oscillating-audion and the regenerative circuit, which had been pending since 1914. Armstrong was struck another blow when his application for a patent on the use of the circuit in oscillation was denied. In 1934 the radio world was shocked by a Supreme Court decision which found that De Forest had invented the regenerative circuit back in August 1912, based on De Forest's testimony. Professor Pupin, the Franklin Institute, and the American Institute of Electrical Engineers all rallied behind Armstrong, for De Forest's notebooks of 1912 did not support the court's interpretation.

Armstrong was shattered by the decision; he felt that his integrity as an inventor had been on trial. Meanwhile, he continued his experiments in static elimination. Since its inception, amplitude modulation (AM) had been plagued by static. He theorized that static had the same characteristics as radio signals: amplitude (strength), frequency (pitch), and phase

ARMSTRONG continued.

(frequency pattern); if this were the case, AM, which carries the audible wave on the crest of a radio wave by varying its amplitude, would never succeed in eliminating static. But what if he were to try imposing sound on a radio wave by varying its frequency? Others had tried experiments with this method with disappointing results. But Armstrong doggedly pursued his experiments until he achieved his goal. In 1933 he was issued a patent for wide-band frequency modulation (FM).

Armstrong took his invention to RCA, which invited him to move his equipment into the NBC experimental station at the Empire State Building. For a year and a half, RCA and NBC engineers tested and analyzed Armstrong's invention, their reports bearing out his claims.

At the same time, at the Empire State Building transmitter, Armstrong demonstrated another of his inventions--multiplex transmission, which makes it possible to send two or more program channels over the same transmitter, and which is the principle of modern stereo broadcasting.

With FM, Armstrong solved three major radio problems: he virtually eliminated static; he provided a degree of fidelity in broadcasting never before achieved; and because FM performed most effectively at the high end of the radio spectrum he opened a new portion of the spectrum to broadcasting. Additionally, FM stations were less costly than AM, both to construct and to operate.

Standard broadcasters, particularly the major networks, perceived the threat of increased competition, and would not support him in his newest venture. In November 1935, RCA requested that he remove his equipment from NBC's experimental station to enable them to pursue their new research in television. He then demonstrated FM before the November 1935 meeting of the Institute of Radio Engineers, making his invention public for the first time.

Failing to get the Institute's backing, Armstrong applied to the FCC for a permit to build his own FM station. The Commission allocated only five usable channels to FM, and granted Armstrong a permit. By the summer of 1938 he had station W2XMN in operation at Alpine, New Jersey. In order to demonstrate the full potential of his innovative broadcasting techniques, Armstrong had to develop his own components, for no existing equipment could do justice to his transmitter's capabilities.

As soon as a few companies began designing and producing FM receivers, othe FM stations began broadcasting. In 1940, the FCC ruled that FM could expand to forty channels and begin commercial service. Just as FM seemed to be establishing a firm foothold, Pearl Harbor brought all development in the new industry to a halt.

At the end of the war, lobbyists for the major networks persuaded the FCC to cut the permissible power of FM transmitters to one-tenth the intended level, which reduced each station's coverage to a single city. At the same time, the FCC shifted the whole FM band to a higher and less favorable frequency range. This decision rendered obsolete all existing FM equipment.

In 1948, Armstrong brought suit against RCA and NBC, charging them with infringing on his FM patents. The next five years of his life were embroiled in the ensuing patent litigation, which sapped his energies and his savings; the creativity which had served him so well when brought to bear on his scientific research was diverted into the fight to gain legal recognition for his inventions. The lengthy court battles proved more than he could bear. He died, a suicide, in 1954

After his death, Major Armstrong's widow took up the fight in his behalf. In early 1954, shortly before his death, Armstrong had filed twenty-one suits for infringements on his FM patents. Court decisions long after his death vindicated his claims on behalf of his FM inventions: all twenty-one suits were ultimately victorious.

Armstrong was one of the great American inventors, ranking with Alexander Graham Bell, Thomas Alva Edison, and Samuel F.B. Morse. His inventions are basic to the advanced communications technologies that fuel modern life: AM and FM radio transmission, stereo broadcasting, and the sound transmission employed in television are only a few of the products of Armstrong's genius. His peers recognized his contributions during his life, the courts recognized them in the years after his death, but widespread public recognition of his achievements has followed more slowly. The printing of the Edwin Howard Armstrong commemorative stamp is a major step in bringing to the American public an awareness of the inventive genius who brought radio from the early crystal-detector head-set stage, accessible to only a few, to a means of communication and entertainment available to the masses.

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AMRAD Amateur Radio Research and Development Corporation

Membership Application/Renewal

Mail to: **William P. Pala, WB4NFB**
5829 Parakeet Drive
Burke, VA 22015

See reverse for overseas mailing rates.

	Annual
Dues: Regular	$15
2nd in family same adr	8
Full-time student	5

Please make checks payable to AMRAD.

Name_____
Ham Call_____ Home Phone( )_____

Address_____
City,
State/Prov_____ ZIP/PC_____

Class License_____ ☐ARRL Member

Interests:
☐Packet Radio ☐Spread Spectrum
☐RTTY ☐Deaf TTY

Computer model_____
Microprocessor type_____

I agree to support the purposes of the Corporation.

*Signature*_____

The Amateur Radio Research and Development Corporation (AMRAD) is a worldwide club of over 500 amateur radio and computer experimenters. It is incorporated in Virginia and is recognized by the U.S. Internal Revenue Service as a tax-exempt scientific and educational organization.

The purposes of AMRAD are to: develop skills and knowledge in radio and electronic technology; advocate design of experimental equipment and techniques; promote basic and applied research; organize technical forums and symposiums; collect and disseminate technical information; and, provide experimental repeaters.

Meetings are on the 1st Monday of each month at 7:30 P.M. at the Patrick Henry Branch Library, 101 Maple Ave E, Vienna, VA. If the first month is a holiday, an alternate date will be announced in the newsletter. Except for the annual meeting in December, meetings are normally reserved for technical talks - not business.

WD4IWG/R is an open repeater for fm voice and digital communications, especially for experimental modes. It is located at Tyson's Corner, McLean, VA. It features semi-private autopatch available to licensed members. Frequencies are: 147.81 MHz in, 147.21 MHz out. The repeater director is Jeff Brennan, WB4WLW.

WB4JFI5/R is a 1200-baud half-duplex packet repeater located on the south leg at the 200 ft. level of the WDVM/WJLA TV tower. The tower is located at Wisconsin Ave. and River Rd. in northwest Washington DC, and the repeater runs the AX.25 level 2 protocol. The frequency for the WB4JFI5 packet repeater is 145.01 MHz simplex.

The AMRAD CBBS, 703-734-1387, is operated by Terry Fox, WB4JFI. The system accepts 110, 300, 450 and 600-baud ASCII, Bell 103.

Handicapped Education Exchange, 301-593-7033, is operated by Dick Barth, W3HWN. HEX accepts 110/300-baud ASCII and Baudot deaf TTY/TDD calls.

AMRAD is affiliated with the American Radio Relay League (ARRL), Foundation for Amateur Radio (FAR), Northern Virginia Radio Council (NOVARC) and the Mid Atlantic Repeater Council (T-MARC).

The AMRAD Newsletter is mailed monthly to members and other clubs on an exchange basis. Technical articles, product announcements, news items, and other copy relating to amateur radio and computing are welcome. Honorariums at a rate of $0.10 per 50-character printed line ($20 maximum per author per issue) are paid for original material accepted. Classified ads are free to members. Commercial ad inquiries are invited. The editor reserves the right to reject or edit any portions of the copy. Items should be mailed by the 8th of the preceeding month to Editor, AMRAD Newsletter, P.O. Drawer 6148, McLean, VA 22106. Full permission for reprinting or quoting items is granted provided that credit is given to both the author and the newsletter. Mailing to U.S. and possessions is by 3rd Class bulk mail. Canadian and Mexican addresses add US$2 for postage. Overseas readers add US$8 for air mail or US$2.30 for surface.

AMRAD officers for 1983 are:

Gerald Adkins, N4GA	703-538-6936	Treasurer
Richard Barth, W3HWN	301-681-7372	Alternate HEX Sysop
David W. Borden, K8MMO	703-450-5284	Director
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